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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/386,112	08/30/1999	MICHAEL R. BRUCE	AMDA.261PA	1027

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EXAMINER

TURNER, SAMUEL A

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 08/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/386,112

Applicant(s)

Bruce et al

Examiner

Samuel A. Turner

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Office Action

The finality of the rejection dated 30 January 2001 has been withdrawn and prosecution of the application has been re-opened due to the newly presented grounds of rejection.

Rejections Under 35 U.S.C. § 112, First

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-16 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

On page 6, lines 4-6 applicant states that interferometry techniques, such as dual-differential detection, are used to profile the surface of the die.

On page 8, lines 9-15 applicant investigated possible defects by directing light through a pair of beam-splitters which are used to create a differential of two beams of light. One light beam is directed into the back side of the semiconductor die and reflected by the surface under test along with a nonreflected beam. The reflected and nonreflected beams are analyzed to determine if there is a surface

defect. Analysis can include comparison with a previously generated reference surface.

On page 10, lines 12+ applicant discloses the operation of figure 2 which is used to obtain a profile of the reference die and the dies under test. Light from a laser(210) passes through a first linear polarizer(212), beam-splitter(220), and $\frac{1}{2}$ waveplate(214), to a surface(231) under test. The reflected light passes back through the $\frac{1}{2}$ waveplate, is reflected by the beam-splitter(220), and is divided by a beam-splitter(222) into two beams which are detected by two detectors and a profile is generated for the surface. Applicant then points to the text of *Confocal Scanning Microscopy and Related Imaging Systems* and supplies pages 232 and 233 from the text.

The provided text of *Confocal Scanning Microscopy and Related Imaging Systems* discloses a typical confocal interference microscope. A laser generates an input beam which is split by a beam-splitter into test and reference beams. The test beam is reflected from the surface of the sample and is recombined with the reference beam which is reflected by a reference mirror. The beams are recombined at the beam-splitter to constructively interfere. The interfered beams are detected by two detectors which are processed to provide profile of the surface of the sample.

Page 6, lines 4-6, page 8, lines 9-15, and pages 232 and 233 of *Confocal Scanning Microscopy and Related Imaging Systems* are all directed to interference

profilometry.

The specification fails to describe how an interference profile is generated from the disclosed invention in order to detect the defects thereon. The closest applicant gets to disclosing any interference is at page 6, lines 11-13 stating "a differential of two beams of light one of which is directed into the back of the semiconductor die and reflected from a surface therein for evaluation along with the nonreflected beam". However how the reflected and nonreflected beams are combined is not disclosed.

Rejections Under 35 U.S.C. § 112, Second

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-16 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite as to how the first beam of light detects defects from the surface of the die. The first beam of light is directed into the back side of the semiconductor die which reflects a second light beam. Because the back side of the semiconductor die is the only surface positively claimed "which reflects a second light beam" no defects are imprinted onto the reflected second light beam. Claim 3 is specific in that it is the back surface which reflects the second light beam.

Claim 1 is incomplete as to how any profile of the circuit side of the die is formed for comparison as there is no interference claimed.

Claim 10 is indefinite as to how the first beam of light detects defects from the surface of the die. The first beam of light is directed into the back side of the semiconductor die which reflects a second light beam. Because the back side of the semiconductor die is the only surface positively claimed "which reflects a second light beam" no defects are imprinted onto the reflected second light beam.

Claim 10 is incomplete as to how any profile of the circuit side of the die is formed for comparison as there is no interference claimed.

Claim 11 is indefinite as to how the first beam of light detects defects from the surface of the die. The first beam of light is directed into the back side of the semiconductor die which reflects a second light beam. Because the back side of the semiconductor die is the only surface positively claimed "which reflects a second light beam" no defects are imprinted onto the reflected second light beam. Claim 12 is specific in that it is the back surface which reflects the second light beam.

Claim 11 is incomplete as to how any profile of the circuit side of the die is formed for comparison as there is no interference claimed.

Rejections Under 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically

disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 7, and 9-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Marx et al(5,880,838).

Marx et al teach a light source(306), first beam-splitter(310), sample(304), second beam-splitter(406), and differential detectors(408,410), see figure 4. The difference between the TE and TM modes allows detection of the surface structures. Not taught is a defect detection embodiment or thinning any semiconductor dies.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the Marx apparatus when the defects desired to be detected are height defects. With regard to thinning the die beforehand applicant points out that such thinning is well known in the art. See page 3, line 18+ of the specification.

Response to Arguments

Applicant's arguments filed 22 March 2002 have been fully considered but they are not persuasive.

With regard to the rejection of claims 1-16 under 35 U.S.C. § 112, first paragraph; in the last paragraph of page 2 applicant argues that sufficient disclosure for dual-differential detection, to form an interference profile, is

described as 232 in figure 2. However applicant never explains how such a differential detection system would work in a multi-surface system with light entering the back side of the device.

Applicant then argues that since generating an interference profile is not claimed the subject matter is not subject to 112/1st disclosure requirements. Applicant never claims or discloses how the defects are detected, only a general statement of dual-differential detection is made.

With regard to the rejection of claims 1-16 under 35 U.S.C. § 112, second paragraph; applicant argues that 112/2 does not require that claims clearly disclose the details of specific embodiments. If the light never reaches the surface of the device which includes the defects then how can the defects be measured ? Section 112/2nd clearly requires that applicant particularly point out and distinctly claim the subject matter of the invention. With regard to method claims 1-9; a step of illuminating the defects is clearly missing. Thus these claims are incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2173.05(l). With regard to apparatus claims 10-16; there is no means, structure, or element claimed which illuminates or receives light reflected by the defects. Thus these claims are incomplete for omitting essential elements or structure, such omission amounting to a gap between the elements or structure. See MPEP § 2173.05(l).

With regard to the rejection of claims 1, 2, 7, and 9-15 under 35 U.S.C. §

103(a) as being unpatentable over Marx et al. Marx teaches a method and apparatus for measuring the dimensions of a microelectronic structure by interference profilometry. When the defects which are to be detected are height defects on the surface of the device the height of the surface needs to be measured. Marx measures the height of the surface of the object. Obviously the skilled artisan when detecting height defects would look to Marx to measure the surface profile from which the height defects can be detected.

With regard to thinning the die beforehand; applicant points out that such thinning is well known in the art. See page 3, line 18+ of the specification. Thus this limitations was admitted as known prior art by applicant.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire **THREE MONTHS** from the date of this action. In the event a first response is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from

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the examiner should be directed to Samuel A. Turner whose telephone number is **(703) 308-4803**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font, can be reached on (703) 308-4881.

The fax phone number for this Group is (703) 308-7722. The faxing of papers related to this application must conform with the notice published in the Official Gazette, 1096 O.G. 30 (15 November 1989). The Group receptionist telephone number is (703) 308-0956.

Any inquiry of a technical nature regarding reissues, petitions, and terminal disclaimers should be directed to Ed Glick whose telephone number is (703) 308-4858, Hien Phan whose telephone number is (703) 308-7502, or Ed Westin whose telephone number is (703) 308-4823.

Any other inquiry of a technical nature, and all inquiries of a general nature including those relating to the status of this application or any patent term adjustment should be directed to TC2800 Customer Service Office whose telephone number is (703) 306-3329.



Samuel A. Turner
Primary Examiner
Art Unit 2877

SAT
August 24, 2002